Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2024, 16(8):10-11

Opinion Article

ISSN: 0975-7384
CODEN (USA): JCPRC5

Evaluating the Pharmacological Potential of Marine-Derived Bioactive Compounds

Grady Titus*

Department of Pharmacy, Northwestern University in Qatar, Doha, Qatar

Received: *26-Jul-2024, Manuscript No. JOCPR-24-145987;* ***Editor assigned:*** *29-Jul-2024, PreQC No. JOCPR-24-145987 (PQ);* ***Reviewed:*** *12-Aug-2024, QC No. JOCPR-24-145987;* ***Revised:*** *19-Aug-2024, Manuscript No. JOCPR-24-145987 (R);* ***Published:*** *26-Aug-2024, DOI:10.37532/0975-7384.2024.16(8).184*

DESCRIPTION

Over 70% of Earth's surface is made up of seas, which provide a huge and mainly unexplored reservoir of species. This diverse environment has an amazing pool of bioactive chemicals that are obtained from the sea, many of which have distinctive structures and strong biological effects. The pharmacological characteristics of these chemicals, which are generated by marine species including sponges, algae, bacteria and mollusks, have shown promise, prompting their investigation as possible therapeutic agents. The pharmacological potential of bioactive chemicals produced from marine sources is investigated in this review, along with their significance in drug discovery, difficulties they provide and potential future routes for development in contemporary medicine.

Marine organisms have evolved in a highly competitive and diverse environment, leading to the production of a wide array of secondary metabolites with unique chemical structures. These bioactive substances frequently have complex molecular structures that are uncommon in terrestrial species. Due to the richness of marine life, substances with a wide range of biological actions, such as antiviral, antibiotic, anticancer and anti-inflammatory qualities, have been discovered. Among the richest sources of bioactive chemicals, for example, have been sea sponges. Disodermolide, a polyketide that was extracted from the sponge *Discodermia dissoluta*, is one famous example. It has strong anti-cancer properties *via* stabilizing microtubules, a process that is analogous to the mode of action of the well-known chemotherapy medication paclitaxel. Similarly, because it may alter protein kinase C activity, bryostatin which is produced from the marine bryozoan *Bugula neritina* has demonstrated potential in the treatment of Alzheimer's and cancer.

Novel mechanisms of action that are different from those of terrestrial medications are frequently possessed by chemicals obtained from marine sources. Because it offers chances to create novel medicines for illnesses that are resistant to existing treatments, this distinctiveness is a useful tool in the drug development process. An innovative method of treating chronic pain without the risk of opioid addiction is ziconotide, a peptide produced from the venom of the cone snail *Conus magus*. It works by blocking N-type calcium channels. Many bioactive chemicals produced from marine sources have a great deal of pharmacological promise and many of these compounds are presently being studied or developed for clinical use. Numerous therapeutic domains, including as cancer, infectious illnesses, neurological disorders and cardiovascular diseases, have demonstrated the potential of these molecules. A number of drugs originating from marine sources have either reached clinical trials or been given approval for use in cancer. One of the first medications produced from marine sources to be licensed for the treatment of cancer is trobetin (Yondelis), which is developed from the sea squirt *Ecteinascidia turbinata*. Its mode of action includes binding to the minor groove of DNA, which disrupts transcription and causes cancer cell death. It has been used to treat ovarian cancer and soft tissue sarcoma. Another instance is eribulin mesylate, often known as Halaven, a synthetic halichondrin B derivative that was first isolated from the marine sponge *Halichondria okadai*. Authorized to treat liposarcoma and metastatic breast cancer, eribulin inhibits microtubule dynamics, causing cell cycle arrest and death.

The treatment of infectious disorders may benefit from the use of chemicals originating from marine sources. The widely used class of antibiotics known as cephalosporins, for instance, originated from the chemical cephalosporin C, which was initially produced from marine fungus. In particular, resistant forms of bacteria have made these antibiotics extremely effective in fighting bacterial infections. The potential for marine-derived antimicrobial peptides as novel antimicrobial agents has also been highlighted. For example, peptides produced from the skin of several fish species have demonstrated strong action against a variety of infections, including fungus and bacteria that are resistant to drugs. Additionally, chemicals obtained from marine sources may provide novel treatment approaches in the field of neurodegenerative illnesses. The previously mentioned bryostatin is being studied for its ability to promote synapse development and lower amyloid-beta plaques, which may help treat Alzheimer's disease. For similar reasons, the neuroprotective properties and potential to lower the risk of cognitive decline of fish oils including marine-derived omega-3 fatty acids have been thoroughly investigated.

Finally, bioactive chemicals produced from marine sources have great potential for the creation of novel medications in a variety of therapeutic domains. Their distinct biological activity and architectures provide great potential to solve unmet medical needs. But in order to reach their full potential, obstacles pertaining to safety, synthesis and sustainability must be overcome. Marine-derived chemicals have the potential to be a key component of future therapeutic discovery and development, providing fresh hope for patients all around the world with sustained research and innovation.